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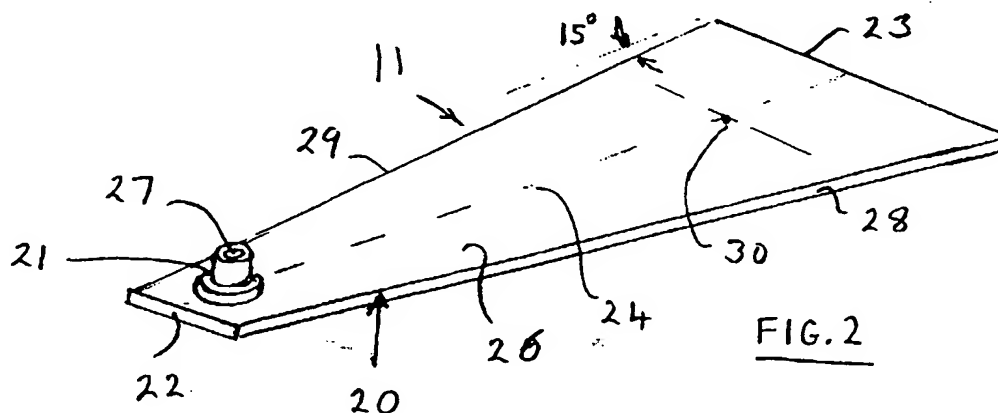
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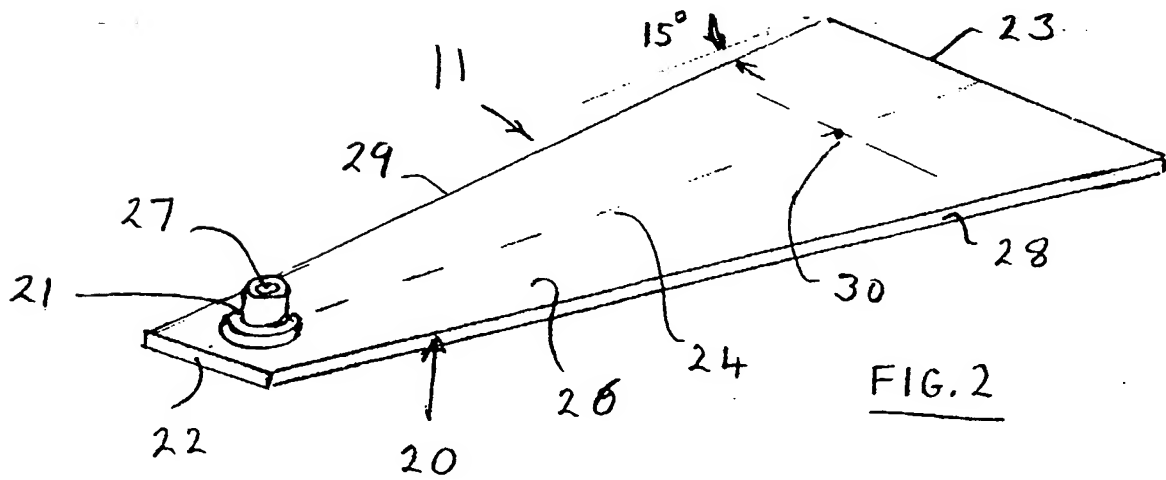
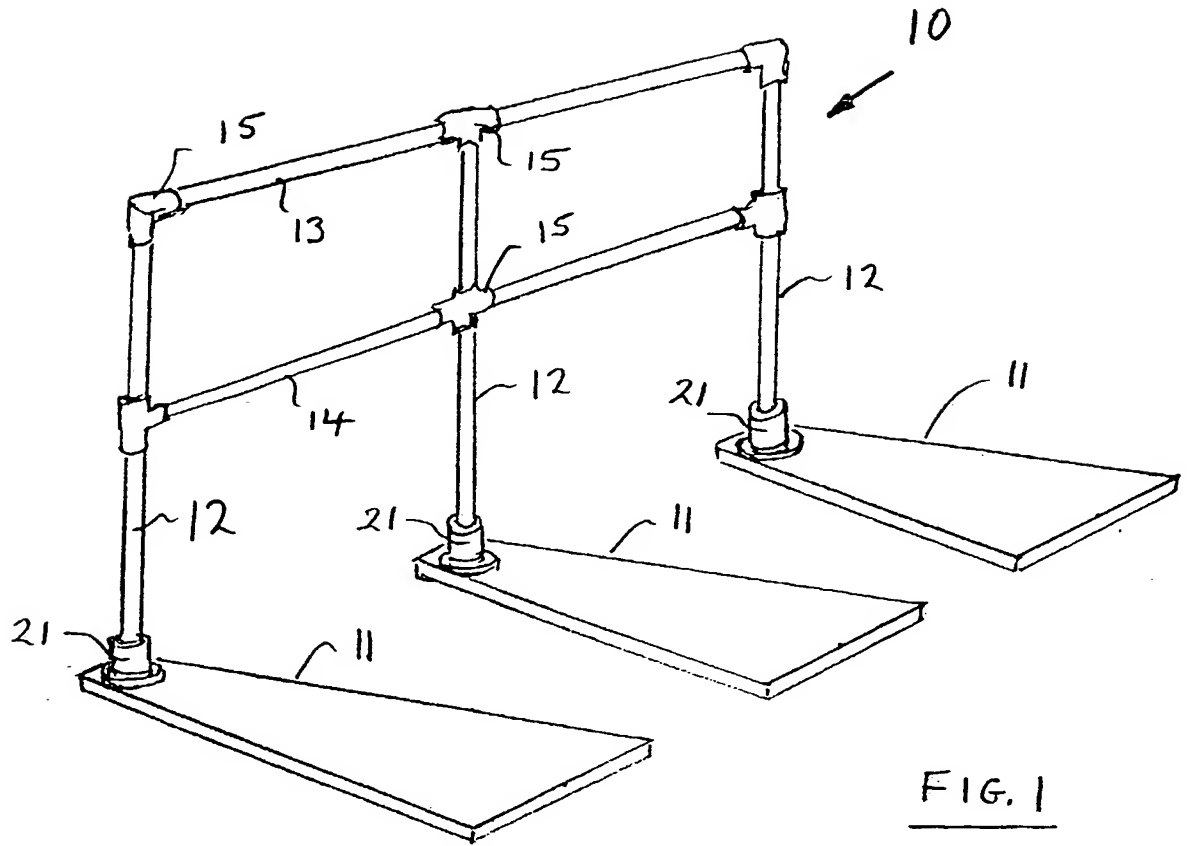
Base plate for a freestanding safety rail

(57) A base plate unit comprising a base plate (20) having a mounting socket (21), for locating an end of a vertical post, which is positioned close to an edge (22) of the plate. The plate is non-rectangular in shape and has a length direction, extending from the socket to a furthestmost edge (23) of the plate, and the distance between the socket and the centre of gravity (3) of at least the part of the plate lying between the socket and the furthestmost edge is greater than half the distance between the socket and the furthestmost edge region.



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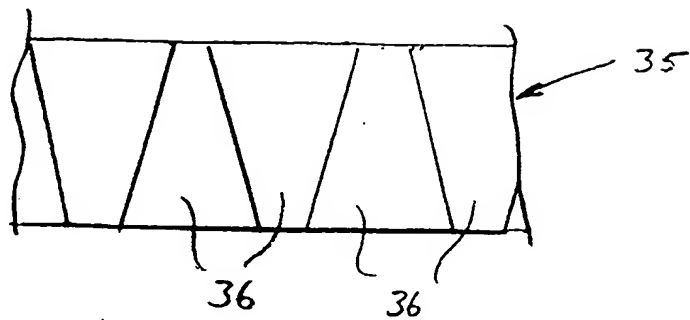


FIG. 3

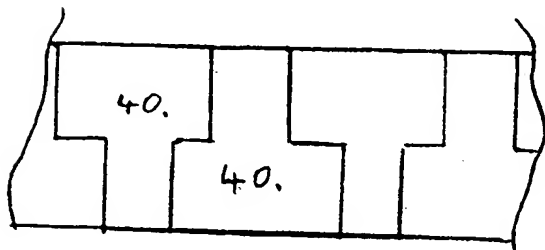


FIG. 4

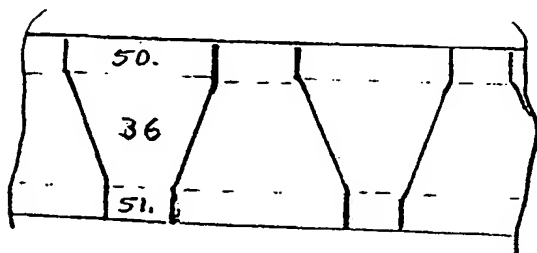


FIG. 5

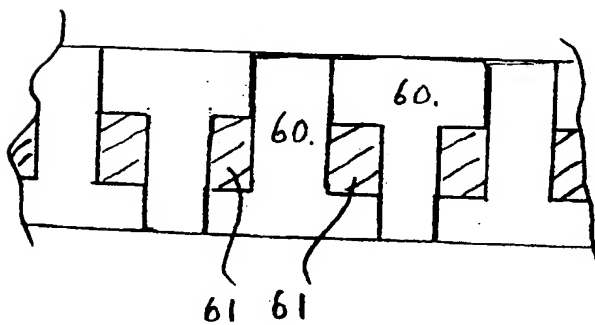


FIG. 6

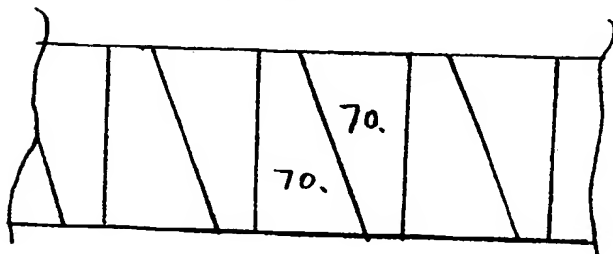


FIG. 7

MODULAR SAFETY RAIL

This invention relates to a modular type safety rail and in particular, though not exclusively, to a modular safety rail suitable for use in providing free-standing roof edge protection.

Modular type safety rail systems are well known and typically comprise straight lengths of metal tubing interconnected by connectors of different types such that, for example, two, three or four way interconnections of horizontally and vertically extending tubes may be achieved.

Tubes serving as vertical posts of a safety rail, and to which horizontally extending tubes are connected, are supported by metal base plates of a rectangular shape and which, in use, rest on the surface of a roof. A flanged mounting socket typically is bolted to an upper surface of the plate, adjacent to one of the shorter edges of the rectangular shape, to provide location for the lower end of a vertical post.

The ability of the free-standing safety rail to avoid toppling when leant on may be achieved by a counter balance weight secured to the end of a spacer tube which, in use, extends horizontally over the roof surface and is secured rigidly to the base plate. This arrangement is particularly suitable if it is not possible or convenient to position a spacer bar to act as a stabiliser member which extends forwards, horizontally, in the direction of potential toppling.

Conventionally the spacer tube is rigidly secured to the base plate by being received firmly in a horizontally extending sleeve which is either welded or has a base flange bolted to the upper surface of the plate, with the major axis of the sleeve being parallel with the length dimension of the plate.

In some installations the presence of roof mounted ventilation and other such equipment places a restriction on the positioning and length of the horizontally

extending spacer tube that can be used for connecting to and spacing of a counter balance weight. Similarly, in some locations a designated roof area provides part of an emergency fire escape route for personnel and it is then most important to ensure that no part of the safety rail installation might cause personnel to trip over. Whilst it is possible to reduce the length of the spacer tube if a heavier counter balance weight is provided, and thereby avoid the spacer bars and counterbalance weights interfering with an emergency escape route or roof mounted equipment, for some roof surfaces there is a limit to the localised acceptable weight loading in order to avoid damage to roofing material.

One object of the present invention is to provide means whereby a required resistance to toppling can be achieved more advantageously than hitherto.

In accordance with one aspect of the present invention a base plate unit for a free-standing safety rail comprises a base plate having associated therewith a mounting formation for locating, in use, an end of a vertical post, the mounting formation being positioned in proximity to an edge of said base plate and said base plate being of a non-rectangular shape having a length direction which extends from said mounting formation to a furthestmost edge region of the base plate and the distance between said mounting formation and the centre of gravity of at least that part of the base plate lying between the mounting formation and said furthestmost region being greater than half said distance between the mounting formation and said furthestmost edge region of the base plate.

The mounting formation may be in the form of a socket which defines a bore in which an end of the vertical post can be received or it may comprise an outwardly facing cylindrical surface for locating in the end of a tubular vertical post. Typically the vertical post will be of a circular outer cross-sectional shape and / or of a tubular form having a cylindrical bore in which case the mounting formation may define a substantially cylindrical surface for engagement with an inner or an outer surface of the end of a post. The end of a post may be of other cross-sectional shape such as square or

rectangular, in which case a mounting formation for use with that post may define a surface of a substantially similar cross-sectional shape.

A mounting formation may be provided with a plurality of rib or other discrete surface regions for engagement with the end of a vertical post.

Preferably said centre of gravity lies spaced from the mounting formation by at least 60% and more preferably by at least 75% of said distance between the mounting formation and furthestmost edge region of the base plate. Whilst the benefit of the subject invention may be attained by said positioning of the centre of gravity of only said part of the base plate lying to one side of the mounting formation, namely that side which extends to said furthestmost edge region, said centre of gravity and the aforedefined positioning thereof may be the centre of gravity of the whole of the base plate.

The centre of gravity may lie at a position on said length direction or a line of symmetry between the base plate and the furthestmost edge region, or to one side thereof.

The non-rectangular shape of the base plate typically may be symmetrical, but non-symmetrical shapes are not excluded. Examples of suitable shapes are triangular and "T" shapes.

The base plate may be formed from sheet material, such as sheet metal, or may be cast from metallic material. Preferably it has a thickness less than 5cm, typically less than 3cm, more preferably less than 2.5cm.

Preferably the upper surface of the plate, being that surface from which the mounting formation extends, is bereft of any structure additional to said mounting formation. The surface may be smooth or may for example be texture, e.g. ribbed to give a non-slip feature.

In a preferred embodiment of the invention the base plate is formed by stamping of strip material such as a strip of sheet steel, and more preferably

the non-rectangular shape is a shape which can be stamped from sheet material without material wastage. Particular examples of such shapes are the aforementioned triangular and "T" shapes. However the invention does not exclude the possibility of stamping sheet material or otherwise forming base plates of shapes which, when formed by stamping, would result in production of shapes of material suitable for other purposes or as scrap.

The base plate may be provided with a protective surface finish to resist corrosion in a manner known per se.

Preferably the mounting formation is located close to an edge of the base plate such that the distance between the centre of the mounting formation and said furthestmost edge region of the base plate is at least 80%, and more preferably at least 90% of the overall length of the base plate as considered in said length direction.

The base plate and mounting formation of a base plate unit optionally may be formed as an integral unit, for example as a single casting or by welding together of said components. Alternatively the mounting formation may be secured mechanically to the base plate, for example by means of screw threaded fittings.

The mounting formation may comprise retention means, such as a screw threaded aperture and a grub screw, for enabling an end of a post to be secured to the base plate unit.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is a perspective view of part of modular safety rail assembly comprising base plate units in accordance with the present invention;

Figure 2 is a perspective view of a base plate unit shown in Figure 1, and

Figures 3 to 7 show examples of shapes of base plate units which may be formed from strip material.

Figure 1 shows a short length of a safety rail installation (10) of a modular free-standing type construction comprising base units (11), vertical posts (12) supported by the base plate units, and horizontal top and intermediate safety rails (13,14), the assembly of vertical and horizontal rails being rigidly interconnected with one another by means of connectors (15) in a manner known per se.

The base plate unit (11) is shown in more detail in Figure 2. It comprises a base plate (20) in the shape of a truncated isosceles triangle symmetrical about a centre line (24). The plate (20) has a short end edge (22) and a longer edge (23) parallel with the edge (22).

At a position close to the short end edge (22) the upper surface (26) of the plate (20) has welded thereto a flanged mounting socket (21), the socket having a central bore (27) to receive the lower end of a vertical post, and the socket wall being provided in known manner with a grub screw (not shown) which can be tightened to engage the lower end of a vertical post to provide a rigid structural interconnection.

The socket (21) has the major axis of the bore (27) thereof lying spaced from the longer edge (23) by a distance of 90% of the length of the base plate in the direction of the centre line of symmetry (24).

The angle of the side edges (28, 29) relative to the line of symmetry (24) in this embodiment of the invention is approximately 20° but it is to be understood that other angles may be used. Typically suitable angles lie between 10° and 45° , more preferably between 15° and 35° .

In this embodiment the centre of gravity of the base plate lies at a position (30) which is spaced from the major axis of the bore of the mounting socket by 75% of the distance along the line (24) from said axis to the edge (23).

The base plate (20) may be formed by stamping of strip material in a manner that forms alternating orientations of stamped material, as made clear by Figure 3 which shows part of a length (35) of strip sheet material of thickness 2cm stamped to produce successive oppositely orientated truncated isosceles triangle shapes (36).

Other shapes that can typically be formed without material wastage by stamping of strip material are shown in Figure 4 and in Figure 5. The Figure 4 version comprises "T" shapes (40) whereas the Figure 5 version comprises in effect the truncated isosceles triangle shape of Figure 3 with the addition of rectangular sections (50, 51) adjacent each of the longer and shorter end edges of the triangular shape.

Figure 6 shows a variation in which "T" shapes (60) have longer tail sections than in Figure 4, resulting in redundant pieces (61) of the material as shown cross-hatched.

The base plate does not need necessarily to be of a symmetrical shape, and particularly where there is a need in a safety rail installation to avoid obstructions it may be preferred to use a non-symmetrical shape such as a right angled triangular shape, and Figure 7 shows part of a strip material marked to provide a series of successively oppositely orientated triangular shapes (70) of that type.

Claims.

1. A base plate unit for a free-standing safety rail comprising a base plate having associated therewith a mounting formation for locating, in use, an end of a vertical post, the mounting formation being positioned in proximity to an edge of said base plate and said base plate being of a non-rectangular shape having a length direction which extends from said mounting formation to a furthestmost edge region of the base plate and the distance between said mounting formation and the centre of gravity of at least that part of the base plate lying between the mounting formation and said furthestmost region being greater than half said distance between the mounting formation and said furthestmost edge region of the base plate.
2. A base plate unit according to claim 1 wherein said centre of gravity lies spaced from the mounting formation by at least 60% of said distance between the mounting formation and furthestmost edge region of the base plate.
3. A base plate unit according to claim 2 wherein said centre of gravity lies spaced from the mounting formation by at least 75% of said distance between the mounting formation and furthestmost edge region of the base plate.
4. A base plate unit according to claim 2 or claim 3 wherein said positioning of the centre of gravity is the position of the centre of gravity of that part of the base plate lying to one side of the mounting formation.
5. A base plate unit according to claim 2 or claim 3 wherein said positioning of the centre of gravity is the position of the centre of gravity of the whole of the base plate.

6. A base plate unit according to any one of the preceding claims wherein the base plate is of a symmetrical shape.
7. A base plate unit according to claim 6 wherein said centre of gravity lies at a position substantially coincident with the line of symmetry of the base plate.
8. A base plate unit according to any one of the claims 1 to 5 wherein the centre of gravity lies displaced from a line extending from the mounting formation to a nearest position of said furthestmost edge region of the base plate.
9. A base plate unit according to any one of the preceding claims wherein the base plate has been formed from sheet material.
10. A base plate unit according to claim 9 wherein the base plate has been formed by cutting of strip material.
11. A base plate unit according to any one of the preceding claims wherein the base plate has a shape which can be cut successively from a length of a strip of material without material wastage.
12. A base plate unit according to any one of the preceding claims wherein the base plate has a thickness less than 2.5cm.
13. A base plate unit according to any one of the preceding claims wherein the base plate comprises an upper surface bereft of structure additional to said mounting formation.
14. A base plate unit according to any one of the preceding claims wherein at least the base plate is provided with a corrosion resistant surface finish.
15. A base plate unit according to any one of the preceding claims wherein the distance between the centre of the mounting formation and said

furthermost edge region of the base plate is at least 80% of the overall length of the base plate as considered in said length direction.

16. A base plate unit according to claim 15 wherein said distance between the centre of the mounting formation and said edge region is at least 90% of said overall length.
17. A base plate unit according to any one of the preceding claims wherein the mounting formation is in the form of a socket which defines a bore adapted to receive the end of a vertical post.
18. A base plate unit according to any one of claims 1 to 16 wherein the mounting formation comprises an outwardly facing surface for locating within the end of a tubular vertical post.
19. A base plate unit according to any one of the preceding claims wherein the mounting formation has been formed prior to attachment to the base plate unit.
20. A base plate unit according to claim 1 and substantially as hereinbefore described.



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Claims searched: all

Examiner: Joanne Pullen
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Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.S): E1S SM, E1D DPB.
Int Cl (Ed.7): E04G, E04H, E01F
Other: Online: EPODOC, WPI, JAPIO.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2338250 A (CHEETHAM)	1-10 & 12-19
A	GB 2299827 A (J P WHEELAN & SONS)	
A	GB 317687 A (MCLEAN)	
X	GB 194207 A (JOHN ELWELL LIMITED) Whole document.	
A	EP 0738809 A1 (PURVIS)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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